

WHAT IS CLAIMED IS:

Sub A

1. A method of simulating connection characteristics of a network, comprising:
 - 5 providing a driver capable of accessing a stream of network packets;
 - calculating a send time for each of the network packets;
 - sequencing the network packets in a queue until the respective send times to simulate a desired propagation connection
 - 10 characteristic;
 - altering the stream of network packets to simulate an additional connection characteristic of the network.
2. The method of claim 1, wherein the propagation connection characteristic is at least one of: (a) bandwidth; (b) transmission delay.
3. The method of claim 2, wherein the additional connection characteristic of the network is at least one of: (a) loss of a network packet; (b) fragmentation of a network packet; (c) reordering of at least 20 two network packets; (d) duplication of a network packet; (e) network address translation of a network packet having an original network address.
4. The method of claim 2, wherein simulating a desired bandwidth comprises:
 - 25 determining a length of a network packet;
 - calculating the send time for the network packet using the network packet length to simulate the desired bandwidth.

Surf a.

5. The method of claim 2, wherein simulating a desired transmission delay comprises adding the desired transmission delay to the send time.

5 6. The method of claim 3, wherein altering the stream of network packets to simulate the network address translation of the network packet comprises:

generating a simulated network address for each new connection; and

10 mapping the original network address to the simulated network address for each network packet.

7. The method of claim 6, wherein the simulated network address is generated randomly.

15 8. The method of claim 3, wherein altering the stream of network packets to simulate the loss of a network packet comprises:

determining a packet dropping frequency; and

deleting the network packet at the packet dropping frequency.

20 9. The method of claim 3, wherein altering the stream of network packets to simulate the fragmentation of the network packet comprises:

determining a packet fragmentation frequency;

separating the network packet into a plurality of new network

25 packets at the packet fragmentation frequency;

dividing data contained in the network packet; and

distributed the divided data between the new network packets.

Sub 10. The method of claim 9, further comprising creating headers for the new network packets.

11. The method of claim 9, wherein the divided data is distributed 5 disproportionately between the new network packets.

12. The method of claim 3, wherein altering the stream of network packets to simulate the reordering of at least two network packet comprises:

10 determining a packet reordering frequency; and
changing an order of the at least two network packets within the network packet stream at the packet reordering frequency.

13. The method of claim 3, wherein altering the stream of network 15 packets to simulate the duplication of the network packet comprises:
determining a packet duplication frequency; and
generating a copy of the network packet at the packet duplication frequency.

20 14. The method of claim 2, wherein altering the stream of network packets comprises changing a network address of each client connection.

15. The method of claim 1, wherein the driver is implemented in an intermediate layer between an upper layer and a lower layer.

25 16. The method of claim 15, wherein the upper layer processes the network packets and the lower layer places the network packets onto a physical media of the network.

fair

17. A method of altering a network packet having an original network address, comprising:
- providing a driver capable of accessing a stream of network packets;
- 5 mapping the original network address to a simulated network address to create an address-modified network packet; and
- modifying an additional connection characteristic of the stream of network packets.
- 10 18. The method of claim 17, wherein the mapping is performed using a two-way mapping table.
- 15 19. The method of claim 18, wherein the two-way mapping table is a two-way hash table.
20. The method of claim 19, wherein the mapping uses a two-way output hash table, a two-way input hash table and a hash information repository.
- 20 21. The method of claim 18, wherein the mapping uses a two-way output mapping table if the network packet is being transmitted and a two-way input mapping table if the network packet is being received.
- 25 22. The method of claim 17, wherein the additional connection characteristic is at least one of: (a) packet loss; (b) packet fragmentation; (c) packet reordering; (d) packet duplication; (e) bandwidth limitation; (f) transmission delay.
23. A network simulation system, comprising:

Sub

a modification module capable of accessing a network packet,
comprising:
an addressing module that replaces an original network
address of a network packet with a simulated network address; and
5 a propagation module that alters a propagation
connection characteristic of the network packet.

24. The network simulation system of claim 23, wherein the
propagation connection characteristic is at least one of: (a) bandwidth; (b)
10 transmission delay.

15 25. The network simulation system of claim 23, wherein the
addressing module further comprises a two-way mapping table that maps
the original network address to the simulated network address.

26. The network simulation system of claim 23, wherein the
modification module further comprises a sequence module that alters a
second connection characteristic of the network packet.

20 27. The network simulation system of claim 26, wherein the
second connection characteristic is at least one of: (a) packet dropping;
(b) packet fragmentation; (c) packet duplication; (d) packet reordering.

25 27. The network simulation system of claim 23, further comprising
a queue module that stores the network packet for a period of time.

28. The network simulation system of claim 27, wherein the
packet queue includes an input queue that stores the network packet if the

sub a'

packet is being received and an output queue that stores the network packet if the packet is being transmitted.

29. The network simulation system of claim 23, further comprising
- 5 a transmission module that removes the network packet from the queue module at a specified time.

30. The network simulation system of claim 29, wherein the specified time is a send time that is determined by the propagation module.

Add a'